

LOWER DEVONIAN OSTRACODES:
REVISION OF SPECIES DESCRIBED BY CHAPMAN (1904) FROM THE
LILYDALE LIMESTONE, VICTORIA

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Abstract

The ostracode types described by Chapman (1904) from the Lilydale Limestone are revised. One generic and twenty-five specific identifications are reduced to five named species (two of which are new) and five un-named species. One specimen is compared with *Paraparchites devonicus* (Příbyl) 1955. Nine specimens are poorly preserved and were not considered suitable for further treatment. *Aechmina jonesi* Chapman is based on an oolith.

Introduction

In 1904, Chapman described ostracode species collected from the Lilydale Limestone, which was then known as the Cave Hill Limestone. Chapman assigned his specimens to 25 species, seven of which were new. Another specimen was identified only generically.

Different authors at different times have assigned the Lilydale Limestone to ages ranging from Middle Silurian to Middle Devonian. Recently it has been assigned to an early Siegenian age on the basis of conodonts and corals (Philip & Pedder 1967). Chapman's description of the ostracodes was made at a time when the Lilydale Limestone was held to be of Silurian age. Consequently Chapman identified his specimens chiefly with Silurian species, but other of his identifications ranged from Ordovician to Lower Carboniferous (Chapman 1904, p. 298).

Chapman in his figures added sulci to the drawing of many of his specimens, when only one is actually sulcate. His orientation of specimens was also misleading, but this is not surprising when the generally confused state of orientation of ostracodes at the time of his writing is considered.

A revision of these types is necessary to any understanding of Australian Lower Devonian ostracodes. To this end, Chapman's collection of Lilydale ostracodes was obtained on loan from the National Museum of Victoria, Melbourne. Thanks are due to T. A. Darragh (Curator of Fossils) and the Trustees of the National Museum of Victoria for permitting the loan.

Ostracodes obtained from samples collected at Lilydale by the author in January 1967 and by A. E. H. Pedder in 1964 yielded further specimens of the species represented in Chapman's collection, as well as several forms which are new. Since the scope of this paper is a revision of Chapman's types and the supporting specimens, descriptions of the new forms will wait till a later date.

The preservation of ostracodes in the Lilydale Limestone is chiefly in the form of internal moulds. This is the case in Chapman's collection as well as the supplementary specimens. This type of preservation lends itself admirably to the extraction of ostracodes from the rock by crushing.

Chapman's collection consists of 30 specimens (all but two consisting of associated valves or internal moulds of associated valves) and one oolith—the specimen which Chapman named *Aechmina jonesi* (NMV P5411). Nine specimens are so damaged or poorly preserved that they are not diagnostic and consequently do not warrant further consideration. These are NMV P1219, P5395, P5396, P5406-P5410 and P5418. Of the remaining forms, three of Chapman's species remain viable and two new species are erected on types misidentified by Chapman. One is compared with *Paraparchites devonicus* (Přibyl) 1955. Five specimens, which were also misidentified by Chapman, possibly form bases for five new species, but none has been named. Two of Chapman's specimens—NMV P5390 and P5394—are compared with *Bairdiocypris subtrigonalis* (Chapman), and *Paraparchites* cf. *devonicus* (Přibyl) respectively. One specimen—NMV P5402—is a palaeocopid, possibly a member of the Family Aparchitidae. A summary of the revision is given in Table 1.

TABLE 1

Summary of Chapman's identification (1904) of Lilydale ostracodes with identifications made in this revision. (* = Holotypes)

Specimen No.	Chapman (1904)		This Paper
	Identification	Page, plate & figure	
NMV P1219	<i>Cyprasinia</i> sp.	312; XVI, 4 & XVII, 1	poorly preserved
NMV P5390	<i>Isochillina labrosa</i> Jones, 1889	299; XVI, 3a, b	Cf. <i>Bairdiocypris subtrigonalis</i> (Chapman)
NMV P5391	<i>Aparchites subaratus</i> Jones, 1893	299; XIV, 10a-c	<i>Leperditia</i> (?) sp. I
NMV P5392	<i>Primitia trigonalis</i> Jones & Holl, 1865	300; XV, 8a-c	<i>Bairdiocypris</i> sp. I
NMV P5393	<i>Primitia subtrigonalis</i> sp. nov.	301; XIII, 1a-c	* <i>Bairdiocypris subtrigonalis</i> (Chapman)
NMV P5394	<i>Primitia punctata</i> Jones, 1887	301; XIII, 2a-c	Cf. <i>Paraparchites</i>
NMV P5395	<i>Primitia semicircularis</i> sp. nov.	301; XIII, 4a-c	Cf. <i>devonicus</i> (Přibyl)
NMV P5396	<i>Primitia</i> (?) <i>matutina</i> Jones & Holl, 1865	302; XIII, 5a, b	poorly preserved
NMV P5397	<i>Primitia reticulata</i> Jones, 1887	303; XIII, 7a, b	poorly preserved
NMV P5398	<i>Primitia</i> (cf.) <i>obsoleta</i> Jones & Holl, 1865	303; XIII, 8a-c	<i>Primitia</i> (?) <i>unlumbonata</i> n. sp.
NMV P5399	<i>Primitia halli</i> sp. nov.	304; XIV, 2a-c	<i>Paraparchites</i> sp. I
NMV P5400	<i>Primitia elongata</i> Krause var. <i>nuda</i> Jones, 1893	304; XIV, 3a-c	* <i>Bairdiocypris</i> (?) <i>halli</i> (Chapman)
NMV P5401	<i>Primitia paucipunctata</i> Jones & Holl, 1865	305; XIV, 4a-c	<i>Leperditia</i> (?) sp. I
NMV P5402	<i>Primitia paucipunctata</i> Jones & Holl, 1865	305; XV, 2a-c	<i>Paraparchites</i> Cf. <i>devanicus</i> (Přibyl)
NMV P5403	<i>Primitia striata</i> Krause, 1891	305; XV, 3a-c	Cf. Family Aparchitidae
NMV P5404	<i>Primitia semicircularis</i> Jones & Holl, 1865	306; XV, 4a-c	<i>Microchillina lilydalensis</i> n. sp.
NMV P5405	<i>Primitia unicornis</i> (Ulrich) 1879	306; XV, 6a, b	<i>Bairdiocypris subtrigonalis</i> (Chapman)
NMV P5406	<i>Xestoleberis holliana</i> sp. nov.	306; XIII, 3a-c	<i>Bairdiocypris</i> sp. I
NMV P5407	<i>Xestoleberis lilydalensis</i> sp. nov.	307; XIV, 8a, b	poorly preserved
NMV P5408	<i>Xestoleberis lilydalensis</i> sp. nov.	307; XIV, 1a-c	poorly preserved
NMV P5409	<i>Xestoleberis lilydalensis</i> sp. nov.	307; XIV, 5a-c	poorly preserved
NMV P5410	<i>Xestoleberis wriglitii</i> Jones var. <i>oblonga</i> nov.	308; XV, 1a, b	poorly preserved
NMV P5411	<i>Aechmina jonesi</i> sp. nov.	308; XIV, 11a, b	oolith
NMV P5412	<i>Argillaecia acuta</i> Jones & Kirkby, 1895	309; XIV, 6a-c	<i>Camdenidea</i> (?) sp. I
NMV P5413	<i>Macrocypris flexuosa</i> sp. nov.	309; XIII, 6a, b	* <i>Bairdia flexuosa</i> (Chapman)
NMV P5414	<i>Macrocypris</i> (cf.) <i>rincl</i> Jones, 1887	310; XIV, 7a-c	<i>Bairdia flexuosa</i> (Chapman)
NMV P5415	<i>Bythocypris holli</i> Jones, 1887	310; XVI, 2a-c	<i>Bairdiocypris subtrigonalis</i> (Chapman)
NMV P5416	<i>Bythocypris halli</i> Jones, 1887	310; XVI, 1a-c	<i>Bairdiocypris subtrigonalis</i> (Chapman)
NMV P5417	<i>Bythocypris halli</i> Jones, 1887	310; XIV, 9a, b	<i>Bairdiocypris</i> sp. I
NMV P5418	<i>Bythocypris caudatis</i> Jones, 1889	311; XV, 7a-c	poorly preserved
NMV P5419	<i>Bythocypris phaseolus</i> var. <i>elongata</i> Jones, 1889	311; XV, 5a, b	<i>Bairdiocypris</i> sp. II

As yet no stratigraphical collection has been made from the Lilydale Limestone to establish whether or not a sequence of ostracode faunas exists. Until this is done and the remainder of the ostracodes are described, it seems preferable to defer any discussion of their stratigraphical significance.

In the synonymies given in the systematic section of this paper, references to Chapman's (1904) paper have been reduced to page, plate and figure numbers. All specimens dealt with are from the Lilydale Limestone.

Specimens prefixed by 'NMV P' are from the fossil collection of the National Museum of Victoria, Melbourne. Those prefixed by 'UNE F' are lodged in the Department of Geology, University of New England, Armidale, N.S.W.

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Systematic Palaeontology

Subclass OSTRACODA Latreille 1806

Order LEPERDITICOPIDA Pokorný 1963

Family LEPERDITIIDAE Jones 1856

Genus *Leperditia* Roualt 1851

Leperditia ? sp. I

(Pl. 7, figs. 9, 10, & 20-27)

Primitia elongata Krause var. *nuda* Jones. Chapman 1904, p. 304; Pl. 14, fig. 3a-c.

Aparchites subovatus Jones. Chapman 1904, p. 299; Pl. 14, fig. 10a-c.

(non) *Primitia elongata* Krause 1891, *Z. dt. geol. Ges.*, 43, 494; Pl. 30, figs. 4a, b.

(nec) *Primitia elongata* Krause var. *nuda* Jones 1893, *Q. Jl. geol. Soc. Lond.*, 49, p. 298; Pl. 13, fig. 6.

(nec) *Aparchites subovatus* Jones 1893, *Q. Jl. geol. Soc. Lond.*, 49, p. 292; Pl. 12, figs. 7, 8a-c.

DESCRIPTION: In lateral view, dorsum straight; hinge straight, parallel to dorsum and $\frac{1}{4}$ of length of earapace. Anterior cardinal angle 140° , posterior cardinal angle 150° . Ventral margin gently convex. Anterior and posterior margins evenly rounded, but anterior more convex than posterior margin. Greatest height almost level with posterior cardinal angle. Overlap slight, right over left. No eye tubercles or postero-dorsal inflation in left valve.

In dorsal view, wider posteriorly. Anterior and posterior ends blunt. Apart from slight concavity in outline close to the anterior and posterior ends, the outline is evenly convex. The right over left overlap can be seen in dorsal and ventral view.

Surface of earapace smooth.

DISCUSSION: Chapman's drawing shows a median suleus; this is certainly absent in the specimen which he described and is also missing in the other specimen. His allocation to the genus *Primitia* of specimen NMV P5400 is consequently mistaken, as is also his identification as *Primitia elongata* Krause var. *nuda* Jones.

It is difficult to conceive that specimen NMV P5391 is conspecific with *Aparchites subovatus* Jones from the Lower Silurian of Britain. In any case the width of the specimen at hand is proportionately larger than that of Jones's species. The poor preservation and the small size of this specimen prevents its full investigation. It is possible that it is an internal mould of a juvenile *Leperditia* sp. I.

The present allocation to the genus *Leperditia* is based on the absence of a velar structure and a channelled hinge which removes this species from the genera

Aparchites and *Paraparchites*. Apart from the normal leperditiid overlap and lateral outline, *Leperditia* sp. I resembles *Leperditia copelandi* Lundin 1965 (a, b) (Henryhouse Formation, late Silurian, Oklahoma, U.S.A.) in the absence of eye tubercles and muscle scar features and in its outline in dorsal view.

MATERIAL: NMV P5391 and P5400 and UNE F10309.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
NMV P5391	0.69	0.37	0.31	1.86	1.19
NMV P5400	0.97	0.50	0.41	1.94	1.22
UNE F10309	0.94	0.50	0.41	1.88	1.22

Order PALAEOCOPIDA Henningsmoen 1953

Family LEPERDITELLIDAE Ulrich & Bassler 1906

Genus *Primitia* Jones & Holl 1865

Primitia ? *uniumbonata* n. sp.

(Pl. 8, fig. 21-28)

Primitia reticristata Jones. Chapman 1904, p. 303; Pl. 13, figs. 7a, b.

(non) *Primitia reticristata* Jones 1887b, Silurian Ostracodes from Gothland, p. 5.

DIAGNOSIS: Suboval, straight hinge, which truncates the smaller non-umbonate valve. Median sulcus narrow, well-defined, curved towards anterior, extending to a large adductor scar. External surface of carapace unknown, but left valve has a broad marginal surface. Left valve umbonate, right valve non-umbonate, therefore overreach is left over right. Overlap left over right. In dorsal and ventral view greatest width anterior.

DESCRIPTION: In right lateral view suboval. Hinge straight extending half the length of the carapace. A narrow, well-defined median sulcus extends to a moderately large adductor muscle scar which is almost centrally placed. Sulcus curved slightly towards the anterior. Left valve oval and umbonate; right valve oval, except for truncation along the hinge, and non-umbonate. Consequently overreach is left over right. Overlap also left over right.

In ventral and dorsal view greatest width anterior. Anterior half with greater curvature than posterior half. Anterior almost blunt.

The corroded external prevents the description of the surface of the carapace. The left valve has a moderately broad marginal surface.

DISCUSSION: Chapman identified his specimen as *Primitia reticristata* Jones 1887b. Jones's (1888) figure, however, differs from the present specimens in having a straight dorsal border.

It is questionable whether this species should be placed in the genus *Primitia*. However, *Primitia* includes both umbonate and non-umbonate forms, and the inclusion of an uniumbonate species does not appear out of place. The alternative would be the crection of a new genus for the inclusion of *uniumbonata* n. sp.

MATERIAL: UNE F10317 (holotype), UNE F10318 and NMV P5397 (paratypes). All partially corroded internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
UNE F10317 (holotype)	1.33	1.01	0.69	1.32	1.46
UNE F10318 (paratype)	1.36	1.05	0.68	1.30	1.54

DERIVATION OF NAME: From *unus* (one; L.) and *umbonata* (bearing a projection, umbonate; L.).

Family PARAPARCHITIDAE Scott 1959

Genus *Paraparchites* Ulrich & Bassler 1906

Paraparchites cf. *devonicus* (Přibyl) 1955

(Pl. 7, fig. 1-6)

Primitia paucipunctata Jones & Holl. Chapman 1904, p. 305; Pl. 14, fig. 4a-c.

Sansabella (*Coelonella*) *devonica* Přibyl 1955, *Sb. ústřed. Úst. geol.* (Palaeont. Sér.), 21, 281; Pl. 1, fig. 3-10 and Pl. 3, fig. 13-15.

(non) *Primitia paucipunctata* Jones & Holl 1865, *Ann. Mag. nat. Hist.* (3), 16, p. 419; Pl. 12, figs. 6c, d.

DESCRIPTION: The overwhelming similarity to *Paraparchites devonicus* (Přibyl) 1955 (originally described under the subgenus *Sansabella* (*Coelonella*)) renders any other description of little value. For this reason his description is paraphrased with a few necessary alterations.

In lateral outline the carapace is subelliptical. The left valve is higher than the right valve, but there is no clear indication of overlap. Greatest height anterior. Dorsal margin slightly convex. The hinge line is straight and channelled. Ventral margin considerably convex, especially in the anterior third; posteriorly it becomes gradually less convex. In dorsal and ventral view suboval in outline. In ventral view, free margins of both valves appear thickened.

The surface of the carapace appears to be smooth.

DISCUSSION: The generic designation of this species is questionable. Přibyl (1955) discussed the status of *Sansabella* and *Coelonella*, and concluded that they can be regarded as subgenera of *Sansabella*. Sohn (*in* Moore (Ed.) 1961) erected a separate family for *Sansabella* Roundy, and thus removes it from *Coelonella* Stewart, which Scott (*in* Moore (Ed.) 1961) placed in synonymy with *Paraparchites* Ulrich & Bassler, and therefore in the family Paraparchitidae. The occasional development of a median pit and a possible velar structure appear to be the only characters which differentiate *Sansabella* from *Paraparchites* U. & B. (*sensu* Scott 1959). Restudy of Roundy's original specimens appears necessary before further discussion is possible.

Despite the difficulties which surround the generic status of the present species, there can be little doubt that it is closely related to *Paraparchites devonicus* (Přibyl). The only basis for differentiating the present form and *P. devonicus* are the differences in size and proportions.

Chapman's identification of his specimen as *Primitia paucipunctata* Jones & Holl is mistaken, since his specimen has no median sulcus.

MATERIAL: UNE F10342 and NMV P5401. Both internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
UNE F10342	0.69	0.42	0.33	1.64	1.27
NMV 5401	0.50	0.30	0.24	1.66	1.25
<i>Paraparchites devonicus</i> (Příbyl) (Holotype)	0.90	0.6	0.38	1.50	1.58

Ostracoda indet. of *Paraparchites* cf. *devonicus* (Příbyl) 1955

(Pl. 7, figs. 7, 8)

Primitia punctata Jones. Chapman 1904, p. 301; Pl. 13, fig. 2a-c.(non) *Primitia punctata* Jones 1887a, *Ann. Mag. nat. Hist.* (5), 19, p. 193; Pl. 7, figs. 9a, b.**DESCRIPTION:** Elongate oval. Inequivalve, right valve more inflate along venter than left.

In lateral view, dorsal border almost straight, ventral margin gently convex in right valve and almost straight in left valve. Anterior margin regularly convex. Posterior margin flattened posteriorly and postero-dorsally. No sulcus. Greatest height anterior. No detectable overreach.

In dorsal and ventral view ovoid, wider anteriorly. Hinge indistinct. In ventral view, thickening of free margins of both valves. No overlap of valves noted.

Anterior and posterior views, cardioform with point towards dorsum.

Surface apparently smooth.

DISCUSSION: Unlike *Primitia punctata* Jones 1887a, Chapman's specimen does not have a median sulcus. Chapman's figures are misleading since, despite the addition of a sulcus, his dorsal view is in fact a ventral view.In some respects this specimen may be a new form. However, it appears to be damaged, and may be a crushed specimen of *Paraparchites* cf. *devonicus*. The marginal thickening agrees with this.**MATERIAL:** NMV P5394—an internal mould.**DIMENSIONS** (in mm): L 0.66, H 0.34, W 0.32; L/H 1.94, H/W 1.06.*Paraparchites* sp. I

(Pl. 7, figs. 39, 40; Fig. 1)

Primitia cf. *obsoleta* Jones & Holl. Chapman 1904, p. 303; Pl. 13, fig. 8a-c.(non) *Primitia obsoleta* Jones & Holl 1865, *Ann. Mag. nat. Hist.* (3), 16, p. 423; Pl. 13, fig. 12a-c.**DIAGNOSIS:** A *Paraparchites* with an almost oval outline in lateral view, with short hinge and reversal of overlap and overreach. Greatest width anterior.**DESCRIPTION:** In lateral view almost perfectly oval, with postero- and antero-dorsal margins slightly flattened. Hinge short, just over $\frac{1}{4}$ of length. Overreach right over left, overlap left over right. Axis subparallel to hinge. Greatest height median.

In dorsal view, wider anteriorly.

Surface of carapace apparently smooth.

DISCUSSION: The present specimens resemble *Paraparchites primaevus* (Kessling) which was originally described under the genus *Antiparaparchites* Coryell & Rogatz (1932). They differ from the latter in having their greatest width anteriorly placed and in their slightly greater overreach and overlap (see Fig. 1).

Since reversal of overlap does not constitute a feature of generic or even specific importance, the genus *Antiparaparchites* must enter into synonymy with *Paraparchites*. Consequently *reversus* Coryell & Rogatz 1932 (the designated type species of *Antiparaparchites*) and *Paraparchites oviformis* Coryell & Rogatz 1932 both belong to the same species as demonstrated by Kellett (1936). Kesling (1958) apparently overlooked Kellett's work (1936) and regarded these species as distinct, but only with some reservations. Placing *Antiparaparchites* as a junior synonym of *Paraparchites* obviates the difficulties raised by Kesling (1958) regarding the disrupted fossil record of *Antiparaparchites*.

P. sp. I and *P. primaevus* (Kesling) show certain similarities with an undescribed species from the Emsian Taemas Limestone of Wee Jasper, New South Wales, and *Aparchites ? lenticularis* Swartz & Swain 1941.

The above description of this species differs radically from that given by Jones & Holl (1865) for *Primitia obsoleta*, and there can be no doubt that they belong to different genera.

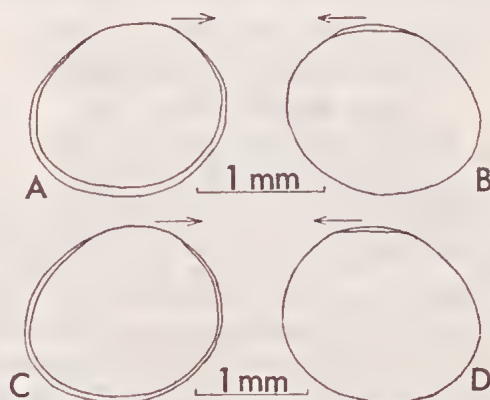


FIG. 1.—Comparison of *Paraparchites* sp. I and *P. primaevus* (Kesling). A and B. Right and left views of *P. sp. I* (UNE F10341). C and D. Same views of *P. primaevus* (Kesling). Based on Kesling 1958, Pl. 1, figs. 1, 2 (holotype).

MATERIAL: UNE F10340, UNE F10341 and NMV P5398 (ventral and dorsal margins damaged). All partial internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
UNE F10340	1.51	1.24	0.77	1.22	1.61
NMV P5398	1.22	0.95	0.57	1.28	1.67

UNE F10341 is a specimen of the next larger instar than specimen UNE F10340, but is broken into two parts.

Palaeocopida indet. cf. Family APARCHITIDAE Jones 1901
(Pl. 7, figs. 11, 12)

Primitia paucipunctata Jones & Holl. Chapman 1904, p. 305; Pl. 15, fig. 2a-c.
(non) *Primitia paucipunctata* Jones & Holl 1865, *Ann. Mag. nat. Hist.* (3), 16, p. 419; Pl. 13, figs. 6c, d.

DESCRIPTION: Suboval in lateral view. Dorsum straight, ventral margin slightly convex. Anterior margin evenly convex. Posterior margin becoming more convex before meeting dorsal border. Anterior cardinal angle 155° , posterior one 135° . Hinge almost $\frac{3}{4}$ of length of carapace.

Oval in dorsal and ventral views. Anterior and posterior ends rounded. Hinge appears channelled. Venter shows indications of a possible velar structure.

Surface of carapace apparently smooth.

DISCUSSION: The absence of a median suleus indicates that Chapman's identification as *Primitia paucipunctata* Jones & Holl is invalid.

This specimen differs from all others known from the Lilydale Limestone. The preservation prevents any identification. The general shape and the indications of a velar structure suggests a palaeocope, possibly a member of the family Aparehitiidae.

MATERIAL: NMV P5402—corroded internal mould.

DIMENSIONS (in mm): L 1.00, H 0.56, W 0.44; L/H 1.78, H/W 1.27.

Order PODOCOPIDA Müller 1894

Family BAIRDIIDAE Sars 1888

Genus *Bairdia* McCoy 1844

Bairdia flexuosa (Chapman) 1904

(Pl. 8, fig. 14-20; Fig. 2)

Macrocypris flexuosa Chapman 1904, p. 309; Pl. 13, figs. 6a, b.

? *Macrocypris* cf. *vinei* Jones. Chapman 1904, p. 310; Pl. 14, fig. 7a-c.

(non) *Macrocypris vinei* Jones 1887a, *Ann. Mag. nat. Hist.* (5), 19, p. 179; Pl. 4, fig. 1-3 and text-figure.

DESCRIPTION: In lateral view, the dorsal border is slightly concave in the anterior quarter, almost flat over the anterior part of the hinge, convex over the posterior part of the hinge, and appears to be slightly concave posteriorly. The ventral margin is convex anteriorly, and sinuous in the middle and posterior portion. In right lateral view, the left over right overlap and overreach is clearly seen along the dorsum; the left over right overlap is rather indistinct along the ventral margin.

In dorsal and ventral view outline distinctly fusiform due to concavities close to the anterior and posterior ends.

The cast produced by the duplicature can be seen in the internal mould. It is well developed towards the anterior, and less so along the venter and posterior. The width of the duplicature is reduced along the venter.

A reconstruction of the internals based on these two specimens is given in Fig. 2.

Surface of carapace smooth.

DISCUSSION: Doubt might be cast on the allocation of these two specimens to the same species. Nevertheless, the characteristic *Bairdia*-like features of the mould, as well as its proportions, suggest that it may belong to *Bairdia flexuosa*. In this case both specimens belong to the same instar.

The elongate shape and especially the sinuous venter characterize this species and differentiate it from most other known species of *Bairdia*. Chapman's choice of specific name seems to be particularly apt in this respect.

The convex dorsal border and the distinct overreach distinguishes *Bairdia flexuosa* Chapman from the genus *Alanella* Bouček as well as from other members of the family Beecherellidae.

MATERIAL: NMV P5413 (holotype) (posterior end missing) and NMV P5414 (an internal cast).

DIMENSIONS (in mm): Holotype: L over 1.71, H 0.66, W 0.47; L/H over 2.5, H/W 1.40.

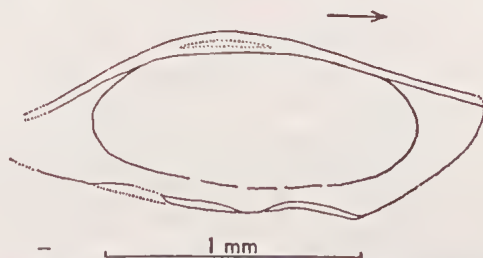


FIG. 2—Reconstruction of internals of *Bairdia flexuosa* (Chapman). Solid lines based on specimens NMV P5413 and NMV P5414. Dotted lines are conjectural.

Genus *Bairdiacypris* Bradfield 1935

Bairdiacypris ? *halli* (Chapman) 1904

(Pl. 8, fig. 1-4)

Primitia halli Chapman 1904, p. 304; Pl. 15, fig. 2a-c.

DESCRIPTION: In lateral view, dorsum straight. Ventral margin straight. Duplicature forms a flange which is straight antero-dorsally and then curves evenly antero-ventrally dropping below the level of the interior antero-ventral outline of the commissure. Anterior rounded. Posterior outline consisting of straight postero-dorsal and postero-ventral margins meeting at a blunt posterior end.

Greatest width anterior in dorsal view. An anterior sharper than posterior.

Carapace absent, and consequently nature of overlap and overreach not discernable from specimens.

Nature of surface unknown.

DISCUSSION: The internal structure is similar to that of *Bairdia flexuosa* (Chapman), but differs from the latter in the wider anterior in dorsal view, the more obtuse anterior and posterior ends in lateral view and the straighter dorsum.

The preservation of the specimen is far from satisfactory. Until more specimens are available, further discussion and comparison with other species is impossible. The allocation to the genus *Bairdiacypris* is based chiefly on the lateral outline and the presence of a duplicature.

MATERIAL: NMV P5399 (holotype)—an internal mould.

DIMENSIONS (in mm): Holotype: L 1.00, H 0.44, W 0.39; L/H 2.27, H/W 1.13.

Family Uncertain

(CYPRIDAE Baird 1845 or BARIDIIDAE Sars 1888)

Genus *Camdenidea* Swain 1953

Camdenidea ? sp I

(Pl. 7, fig. 13-19)

Argilloecia acuta Jones & Kirby. Chapman 1904, p. 309; Pl. 14, fig. 6a-c.

(non) *Argilloecia* (*Bythocypris*) *aequalis acuta* Jones & Kirkby 1895, *Ann. Mag. nat. Hist.* (6), 16, p. 457; Pl. 21, fig. 8.

DESCRIPTION: In lateral view, anterior subquadrate, posterior subacuminate and venter concave. Dorsal border and dorso-posterior margin evenly convex.

Hinge short, about 1/3 of length of carapace. Overreach left over right. Overlap indeterminable.

In dorsal and ventral view laterally compressed, with parallel sided outline. Anterior and posterior ends about equally rounded.

A narrow and entire duplicature can be seen in both valves of the specimens. No indication of muscle scars due to poor preservation.

DISCUSSION: The concave venter differentiates Chapman's specimen from *Argilloecia* (*Bythocypris*) *aequalis acuta* Jones & Kirkby.

The internals of *Camdenidea* have been described by Swain (1953). They appear to agree with the features seen in the specimens at hand. However, Swain (1953) described the duplicature as moderately wide ventrally and postero-ventrally and narrow elsewhere. This contrasts with the condition in *Camdenidea* ? sp. I in which the duplicature appears to be narrow along its entire course.

Camdenidea ? sp. I differs from *C. camdenensis* Swain (the type species) and *C. bloomfieldensis* (Swartz & Swain), not only in the nature of the duplicature, but also in being laterally compressed. It might be argued that the compressed appearance of *C.* ? sp. I is due to the absence of the carapace, but the carapace would have to be considerably thickened laterally for this to be the case. *C.* ? sp. I also differs from these two species in being considerably smaller.

MATERIAL: NMV P5412, UNE F10336 and three other specimens (UNE F10337/9). All internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
NMV P5412	0.89	0.49	0.33	1.80	1.48
UNE F10336	0.92	0.50	0.35	1.84	1.43

Family BAIRDIOCYPRIDIDAE Sohn 1961

Genus *Bairdiocypris* Kegel 1932

Bairdiocypris ? *subtrigonalis* (Chapman) 1904

(Pl. 9, fig. 4-27; Fig. 3)

Primitia subtrigonalis Chapman 1904, p. 301; Pl. 13, fig. 1a-c.

Primitia semicircularis Jones & Holl. Chapman 1904, p. 306; Pl. 4, fig. 4a-c.

Bythocypris holli Jones. Chapman 1904, p. 310 (*pars*); Pl. 16, figs. 1a-c, 2a-c.

cf. *Isochilina labrosa* Jones. Chapman 1904, p. 299; Pl. 16, figs. 3a, b.

(non) *Primitia semicircularis* Jones & Holl 1865, *Ann. Mag. nat. Hist.* (3), 16, p. 424; Pl. 13, fig. 10a-c.

(nec) *Bythocypris holli* Jones 1887a, *Ann. Mag. nat. Hist.* (5), 19, p. 184; Pl. 5, figs. 1a, b & 2, and Pl. 6, figs. 3a, b & 4a, b.

(nec) *Isochilina labrosa* Jones 1889, *Ann. Mag. nat. Hist.* (6), 3, p. 383; Pl. 17, figs. 11, ii, and text figs. 3 & 4.

DIAGNOSIS: *Bairdiocypris* with subtriangular lateral outline in later instars and almost semicircular earlier instars. Venter concave. Overlap slight. Ventral margins thickened and indications of thin (?) duplicature in postero-ventral portion of left valve.

DESCRIPTION: Subtriangular in lateral view in later instars; earlier instars almost semicircular. Inequivalve, left valve overreaching right valve along dorsal border. Overlap left over right, slight. Ventral margin moderately concave to

almost straight. Dorsal border in immature instars evenly convex. In later and adult instars, similar but flattened antero- and postero-dorsally. Antero-ventral margin angular to strongly convex; postero-ventral margin usually less strongly convex. Hinge straight, about $2/5$ of length of carapace. Hinge line sloping downwards posteriorly.

Tcenomorph with greatest width at mid-length and acute anterior and posterior ends. In ventral view commissure straight; in dorsal view commissure runs along centre-line anteriorly, swings to the right along the hinge and then swings sharply to the centre-line behind the hinge.

Internal features. Free margins thickened. Indications of a thin inner lamella (?) in the postero-ventral portion of the left valve.

Heteromorph differs from the above in being more elongate posteriorly, when seen in lateral aspect. In dorsal view, posterior more inflate than in tcenomorph, with greatest width posterior of mid-length. Anterior end acute and posterior end decidedly obtuse. In ventral view, commissure swings medially to the left side. The tcenomorph and the heteromorph are compared in Fig. 3.

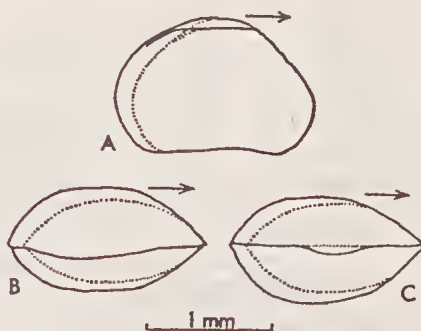


FIG. 3—*Bairdiocypris subtrigonalis* (Chapman). Comparison of right lateral (A), dorsal (B) and ventral (C) views of heteromorph (NMV P5416) solid lines and tcenomorph (NMV P5415) dotted lines. Both to same scale.

DISCUSSION: *Bythocypris holli* as originally described and figured by Jones (1887a) appears to contain at least two species. The figured specimens which most closely resemble Chapman's specimens (Jones 1887a, Pl. 5, figs. 1a-c & 2) differ from Chapman's in being considerably smaller and having a significantly smaller L/H ratio.

Bairdiocypris semicircularis (Jones & Holl) 1865 appears to be very similar to both the holotype of *Bairdiocypris subtrigonalis* (Chapman) and the specimen ascribed by Chapman to Jones & Holl's species (i.e. specimen NMV P5404). Even the dimensions are similar. However, the figures of *B. semicircularis* (J. & H.) (Jones & Holl 1865, Pl. 13, fig. 10a-c) show an acute anteroventral outline in lateral view and a dorsal outline which is wider posteriorly (fig. 10c). These differences separate *Bairdiocypris subtrigonalis* (Chapman) from *B. semicircularis* (J. & H.).

Krömmelbein (1955, p. 205) suggested that a specimen described by him as *Bairdiocypris* sp. A could have close affinities with Chapman's specimen NMV P5416 (i.e. the heteromorph). Krömmelbein's specimen—a single left valve—although smaller, has similar proportions to Chapman's. Nevertheless, its dorsal

and ventral outline is almost symmetrical, which contrasts with the posteriorly inflate nature of specimen NMV P5416.

The presence of a feature which may be interpreted as an inner lamella in the postero-ventral portion of the left valve is not what would be normally expected in a *Bairdiocypris*. Apart from this feature, the specimens possess the characters of that genus. Since there is doubt concerning the true nature of this feature, it appears convenient to place this species in *Bairdiocypris* for the time being.

MATERIAL: NMV P5393 (holotype). Other specimens: NMV P5404, P5415 (adult, ♂) and P5416 (adult, ♀), and UNE F10315, F10316, F10333 and F10343-10345. All internal moulds. Specimen NMV P5390—a single valve—is comparable with this species, but is considerably larger and may well belong to a new species.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
NMV P5416 ♀	1.54	1.02	0.78	1.53	1.31
NMV P5415 ♂	1.39	1.03	0.66	1.35	1.56
UNE F10333	1.00	0.75	0.51	1.33	1.47
UNE F10316	0.81	0.64	0.41	1.27	1.56
NMV P5393 (holotype)	0.62	0.48	0.30	1.29	1.60
UNE F10344	0.45	0.35	0.24	1.28	1.46
? NMV P5390	1.80	1.53	±0.80	1.35	±1.67

Bairdiocypris sp. I

(Pl. 8, fig. 5-13; Pl. 9, fig. 1-3)

Primitia trigonalis Jones & Holl. Chapman 1904, p. 300; Pl. 15, fig. 8a-c.

Primitia unicornis (Ulrich). Chapman 1904, p. 306; Pl. 15, figs. 6a, b.

Bythocypris holli Jones. Chapman 1904, p. 310 (*pars*); Pl. 14, figs. 9a, b.

(non) *Primitia trigonalis* Jones & Holl 1865, *Ann. Mag. nat. Hist.*, 16, p. 421; Pl. 13, figs. 4a, b.

(nec) *Leperditia unicornis* Ulrich 1879, *J. Cincinnatti nat. Hist. Soc.*, 2, p. 10; Pl. 7, fig. 4.

(nec) *Bythocypris holli* Jones 1887a, *Ann. Mag. nat. Hist.* (5), 19, p. 184; Pl. 5, figs. 1a, b & 2 and Pl. 6, figs. 3a, b & 4a, b.

DESCRIPTION: Subtriangular in lateral view. Dorsal border convex with flattening anteriorly and posteriorly of hinge. Anterior and posterior outline evenly convex, posterior more convex than anterior. Ventral margin slightly concave, with greatest concavity usually about 1/3 from anterior. Inequivalve, left overreaching and overlapping right valve. Overlap slight.

In dorsal and ventral aspect outline of valves subparallel. Anterior end acute, posterior end orthogonal to obtuse.

DISCUSSION: *Primitia trigonalis* Jones & Holl 1865 as originally described and figured appears to be leperditellid, and consequently bears no relationship to the present material. An adventitious patch of matrix on specimen NMV P5405 gives only a generalized similarity to *unicornis* Ulrich 1879. *Bairdiocypris holli* (Jones) 1887a is similar to the present species, but the former has a more convex antero- and postero-dorsal outline and a considerably smaller H/W ratio.

The present species differs from *B. subtrigonalis* (Chapman) in being proportionally more elongate and less wide, in being subtriangular throughout its

ontogeny, and in having an orthogonal or obtuse posterior outline in dorsal or ventral view.

MATERIAL: NMV P5392, P5405 and P5417, and UNE F10310-F10314 and F10335. All internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
UNE F10335	1.39	0.85	0.59	1.63	1.44
NMV P5405	1.13	0.71	0.49	1.61	1.45
NMV P5392	0.71	0.47	0.33	1.51	1.43
UNE F10310	0.57	0.40	0.29	1.43	1.37
NMV P5417	0.59	0.41	0.29	1.44	1.41

***Bairdiocypris* sp. II**

(Pl. 7, fig. 35-38)

Bythocypris phaseolus var. *elongata* Jones. Chapman 1904, p. 311; Pl. 15, figs. 5a, b.
(non) *Bythocypris phaseolus* var. *elongata* Jones 1889, *Ann. Mag. nat. Hist.* (6), 4, p. 271; Pl. 15, fig. 8a-c.

DESCRIPTION: Reniform, elongate, in lateral view. Dorsal border evenly convex; concave ventral margin with greatest concavity medially. Anterior margin more convex than posterior margin. Overlap and overlap left over right. Right valve with indication of postero-ventral furrow.

Greatest width anterior in dorsal and ventral view. Outline slightly concave near anterior end. Overlap greater at posterior end.

DISCUSSION: Krömmelbein (1952, Pl. 4) figured sections of *Bairdiocypris uexheimensis* (Kegel). From these sections it becomes apparent that internal moulds of *Bairdiocypris* have a considerably larger L/H ratio than do complete specimens because of the thickening of the carapace of the left valve along the ventral overlap. For this reason, the present specimen appears to be considerably more elongate than other species of *Bairdiocypris*. Nevertheless, the present specimen is more elongate even allowing for the apparent elongation due to its being an internal mould. This differentiates the present specimen from other species of *Bairdiocypris* such as *B. uexheimensis* and *B. gerolsteinensis*. It nevertheless appears premature to give a specific name to this specimen until further material is available.

MATERIAL: NMV P5419—an internal mould.

DIMENSIONS (in mm): L 1.05, H 0.48, W 0.35; L/H 2.18, H/W 1.37.

PODOCOPIDA, Family Uncertain

Genus *Microcheilinella* Geis 1933

Microcheilinella lilydalensis n. sp.

(Pl. 7, fig. 28-34)

Primitia striata Krause. Chapman 1904, p. 305; Pl. 15, fig. 3a-c.

(non) *Primitia striata* Krause, 1891, *Z. dt. geol. Ges.*, 43, p. 496; Pl. 31, figs. 4 & 5a-c.

DIAGNOSIS: A *Microcheilinella* with oblong to suboval lateral outline. Dorsum

convex with flattened median third, ventral margin slightly convex. Almost ovoid dorsal outline, with obtuse posterior and orthogonal anterior ends. Hinge $1/3$ of length of carapace.

DESCRIPTION: In lateral view oblong to suboval. Dorsum convex with flatter median third. Ventral margin gently and evenly convex. Anterior outline sharper than posterior. Anterior margin evenly and tightly convex. Posterior margin formed by continuation of postero-dorsal and ventral curvature, which meet in the postero-ventral region which has a tightly convex outline.

In dorsal view almost ovoid, with decidedly obtuse posterior and nearly orthogonal anterior ends. Hinge channelled, occupying just over one-third of length of carapace. In ventral view, the left over right overlap can be seen. The contact between the valves swings to the left, so that the right valve appears larger. Duplication present on right valve, but not observed in left valve.

Nature of surface unknown.

DISCUSSION: Rozhdestvenskaya (1962) described 12 species of *Microcheilinella* from the Middle Devonian of Bashkiria, USSR. Four had been previously named by Polenova, and the remainder were new. Of this group of species, only *M. modica* Rozhd. has the general dorsal and lateral outline which characterizes *M. lilydalensis* n. sp. *M. modica* differs from *M. lilydalensis* in having a flatter venter, in being more elongate and in being less tumid in anterior or posterior aspect. *M. modica* also differs in that the lateral outline is oblong, and the dorsal outline is acute anteriorly rather than orthogonal. *M. punctilata* (Ulrich) 1891 differs from *M. lilydalensis* in having a rounded posterior outline in dorsal view.

As in several other cases, Chapman's specimen does not have a median sulcus, and consequently his identification as *Primitia striata* Krause is erroneous.

MATERIAL: UNE F10323 (holotype), NMV P5403 (damaged) and UNE F10324 (paratypes). Also other specimens. All internal moulds.

DIMENSIONS (in mm):

	L	H	W	L/H	H/W
UNE F10323 (holotype)	0.95	0.54	0.63	1.76	0.86
UNE F10324 (paratype)	0.92	0.53	0.61	1.74	0.87
NMV P5403 (paratype)	—	0.42	0.50	—	0.84
<i>M. modica</i> Rozhd.	0.74	0.34	0.37	2.12	0.92

DERIVATION OF NAME: From Lilydale (Limestone) and *-ensis*, L. suffix denoting place.

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Explanation of Plates

All specimens uncoated unless stated. All from Lilydale Limestone (Lower Devonian), Victoria. Magnification about $\times 25$.

PLATE 7

- Fig. 1-6—*Paraparchites* cf. *devonicus* (Přibyl). 1, 2, 3 & 4. Left, right, dorsal and ventral views of UNE F10342. 5 & 6. Left and ventral views of NMV P5401.
 Fig. 7-8—*Ostracoda* indet. Cf. *Paraparchites* cf. *devonicus* (Přibyl). 7 & 8. Left and ventral views of only specimen (NMV P5394).
 Fig. 9, 10—*Ostracoda* indet. Cf. *Leperditia* ? sp. I. 9 & 10. Left and dorsal views of only specimen (NMV P5391).
 Fig. 11, 12—*Ostracoda* indet. Cf. Family *Aparchitidae*. 11 & 12. Right and dorsal views of only specimen (NMV P5402).
 Fig. 13-19—*Camdenidea* ? sp. I. 13, 14, 15 & 16. Right, left, dorsal and ventral views of NMV P5412. 17, 18 & 19. Right, left and ventral views of UNE F10336. Both specimens internal moulds.
 Fig. 20-27—*Leperditia* ? sp. I. 20, 21, 22 & 23. Left, right, dorsal and ventral views of UNE F10309. 24, 25, 26 & 27. Same views of NMV P5400.
 Fig. 28-34—*Microcheilinella lilydalensis* n. sp. 28, 29 & 30. Right, dorsal and ventral views of holotype (UNE F10323). 31, 32, 33 & 34. Left, right, ventral and dorsal views of paratype (UNE F10324).
 Fig. 35-38—*Bairdiocypris* sp. II. 35, 36, 37 & 38. Right, left, ventral and dorsal views of only specimen (NMV P5419).
 Fig. 39, 40—*Paraparchites* sp. I. 39 & 40. Right and left views of specimen UNE F10341.

PLATE 8

- Fig. 1-4—*Bairdiocypris* ? *halli* (Chapman). 1, 2, 3 & 4. Left, right, ventral and dorsal views of holotype (only specimen) (NMV P5399). Internal mould.
 Fig. 5-13—*Bairdiocypris* sp. I. 5, 6 & 7. Dorsal, left and ventral views of specimen NMV P5405. 8 & 9. Ventral and left views of specimen UNE F 10311. 10 & 11. Same views of specimen UNE F10310. 12 & 13. Same views of specimen NMV P5417.
 Fig. 14-20—*Bairdia flexuosa* (Chapman). 14, 15 & 16. Left, right and ventral views of specimen NMV P 5414. Internal mould. 17, 18, 19 & 20. Ventral, dorsal, left and right views of holotype (NMV P5413).
 Fig. 21-28—*Primitia uniumhonata* n. sp. 21, 22, 23 & 24. Dorsal, ventral, right and left views of holotype (UNE F10317). 25, 26, 27 & 28. Same views of paratype (UNE F10318).

PLATE 9

- Fig. 1-3—*Bairdiocypris* sp. I. 1, 2 & 3. Left, right and dorsal views of specimen UNE F10335. Coated with magnesium oxide.
 Fig. 4-27—*Bairdiocypris subtrigonalis* (Chapman). 4, 5, 6 & 7. Left, right, ventral and dorsal views of holotype (NMV P5393). 8 & 9. Right and ventral views of specimen UNE F10343. 10 & 11. Same views of specimen NMV P5404. 12 & 13. Same views of specimen UNE F10315. 14 & 15. Same views of specimen UNE F10316. 16, 17, 18 & 19. Ventral, dorsal, right and left views of specimen UNE F10333 (Teenomorph, 'adult-1'). 20, 21, 22 & 23. Same views of specimen NMV P5415 (Teenomorph, adult). 24, 25, 26 & 27. Same views of specimen NMV P5416 (Heteromorph).